What is Claimed is:

1. A transmitting circuit apparatus comprising: a first digital modulator and a second digital modulator for modulating an I signal and a Q signal which are multi-valued digital baseband modulation signals, into a digital I signal and a digital Q signal, respectively, having the number of bits smaller than that of said baseband modulation signals; and a quadrature modulator for outputting a signal synthesized from the signals generated by modulating (two) carrier waves each having a phase perpendicular to each other by using said modulated I and Q signals, respectively.

2. A transmitting circuit apparatus of Claim 1, wherein said first and second digital modulators modulate said I and Q signals which are multi-valued digital baseband modulation signals into two-valued digital I and Q signals, respectively.

3. A transmitting circuit apparatus of Claim 1 or 2, wherein each of said first and second digital modulators comprises a sigma-delta modulator of at least second order or higher.

4. A transmitting circuit apparatus of any one of Claims 1 to 3, further comprising a first and a second band-pass filter for reducing unnecessary signals outside the transmission frequency band from said signals generated by modulating said carrier waves each having a phase perpendicular to each other by using said modulated I and Q signals, respectively, wherein said signals go through said first and second band-pass filters,

respectively, and are then synthesized into an output signal of said quadrature modulator.

5. A transmitting circuit apparatus of any one of Claims 1 to 3, further comprising a band-pass filter connected to the output of said quadrature modulator and for outputting a signal after reducing unnecessary signals outside the transmission frequency band from the output signal of said quadrature modulator.

6. A transmitting circuit apparatus of any one of Claims 1 to 5, wherein said quadrature modulator comprises a first and a second digital RF modulator each for performing amplitude modulation on each of said carrier waves having a phase perpendicular to each other, wherein said modulated I and Q signals control said first and second digital RF modulators, respectively, thereby to perform step-like amplitude modulation on said carrier waves, wherein the modulated signals are synthesized into a signal, and wherein the signal is then output.

7. A transmitting circuit apparatus of Claim 6, wherein each of said first and second digital RF modulators comprises a power amplifier, wherein each of said modulated I and Q signals controls the power supply of each of said power amplifiers thereby to perform amplitude modulation on each of said carrier waves, and wherein said amplitude-modulated signals are synthesized into an output signal of said quadrature modulator.

8. A transmitting circuit apparatus of Claim 6, wherein each

of said first and second digital RF modulators comprises an amplitude modulator and a power amplifier, wherein each of said carrier waves is modulated using each of said modulated I and Q signals by each of said amplitude modulators, and then amplified by each of said power amplifiers, and wherein said amplified signals are synthesized into an output signal of said quadrature modulator.

9. A transmitting circuit apparatus of Claim 6, wherein each of said first and second digital modulators comprises a power amplifier composed of a dual gate FET, wherein each of said carrier waves is input to the first gate of each of said dual gate FET's, wherein each of said modulated I and Q signals controls the output signal of each of said power amplifiers via the second gate terminal of the dual gate FET thereby to perform amplitude modulation on each of said carrier waves, and wherein said amplitude-modulated signals are synthesized into an output signal of said quadrature modulator.

10. A transmitting circuit apparatus of any one of Claims 7 to 9, wherein each of said power amplifiers constitutes a final amplifying stage, and hence no amplification circuit for the transmission signal is provided in the circuit in the stages after the quadrature modulator.

11. A transmitting circuit apparatus of any one of Claims 1 to 10, comprising: E/O converters each for converting the output signal of each of said first and second digital modulators into

an optical signal having a wavelength different from each other; and O/E converters each for converting the optical signal transferred from each of said E/O converters into an electric signal; wherein the output signal of each of said O/E converters is input to said quadrature modulator thereby to perform amplitude modulation on each of said carrier waves.

12. A transmitting circuit apparatus of Claim 11, wherein said digital I and Q signals converted into optical signals each having a different wavelength are transferred through a common optical fiber.

13. A transmitting circuit apparatus of Claim 11 or 12, wherein each of said carrier waves is generated from the digital I or Q signal having been restored into an electric signal by each of said O/E converters

14. A transmitting circuit apparatus of Claim 11 or 12, further comprising: another E/O converter for converting the output signal of a reference signal source into an optical signal having a wavelength different from those of the optical signals of said digital I and Q signals; and an O/E converter for converting the optical signal transferred from said E/O converter into an electric signal; wherein said carrier waves are generated from the output signal of said O/E converter.

15. A transmitting circuit apparatus of any one of Claims 3 to 14, wherein each of said sigma-delta modulators comprises an n-th-order integrator, a quantizer, and a feedback circuit,

wherein a value input to said n-th-order integrator undergoes n-th-order integration and is then input to said quantizer thereby to be quantized into a digital value, wherein said quantized value serves as the output signal of said sigma-delta modulator, and at the same time, is input to said feedback circuit, and wherein the output signal of said feedback circuit is added to the input value of said sigma-delta modulator and the result is input to said n-th-order integrator.

16. A transmitting circuit apparatus of any one of Claims 3 to 15, wherein each of said sigma-delta modulators comprises a plurality of lower-order sigma-delta modulators connected in multi-stage, wherein the output signal of each of said plurality of lower-order sigma-delta modulators is synthesized by connecting the output to a differentiator having a configuration expressed by a z transform

$$(1-z^{-1})^m$$

with the degree m up to the preceding stage.

17. A transmitting circuit apparatus of any one of Claims 3 to 16, wherein the output of each of said first and second sigma-delta modulators is provided with a digital filter having low-pass characteristics.